```
FILE 'HCAPLUS' ENTERED AT 08:38:34 ON 10 MAR 2004
L1  (       100)S (O3W/MF OR O2W/MF OR O W/ELF) AND 2/ELC
              AND 1/NC AND OXIDE NOT PEROXIDE NOT TUNGSTATE
L2  (       358)S (C.SI/MF OR CSI/MF OR C SI/ELF) AND 2/ELC
              AND 1/NC AND CARBIDE? NOT SILICATE?
L3  (        78)S (O.PB/MF OR OPB/MF OR O PB/ELF) AND 2/ELC AND 1/NC
L4  (       112)S (O2.ZR/MF OR O2ZR/MF OR O ZR/ELF) AND 2/ELC AND 1/NC
L5  (        67)S (S.ZN/MF OR SZN/MF OR S ZN/ELF) AND 2/ELC AND 1/NC
L6  (        43)S (GA.P/MF OR GAP/MF OR GA P/ELF) AND 2/ELC AND 1/NC
L7  (        51)S (GA.N/MF OR GAN/MF OR GA N/ELF) AND 2/ELC AND 1/NC
L8  (         1)S 1317-82-4
L9  (   1744859)S (A3/PG(L)A5/PG OR A2/PG(L)A6/PG OR A4/PG )
L10 (         1)S US2002030194/PN
L11             SEL PLU=ON  L10 1- IC :       6 TERMS
L12             QUE (EFFIC####### OR ABILIT### OR OPTIM?)
L13             QUE HEMI? OR FRENEL? OR FRESNEL? OR ELLIPSOID? OR LENS##
L14             QUE SUPERSTRATE# OR SUPER(W)STRATE# OR (TOPMOST OR EMITT? OR EMMISS?
                OVER OR TOP OR UPPER? OR TRANSPAREN?)(2A)(LAYER OR STRATUM OR REGION
                OR AREA OR WINDOW)
                OR OVERLAY#### OR OVERLAI###
L15             QUE (ACTIVE OR SEMICONDUCT? OR SEMI(W)CONDUCT?)(2A)(LAYER# OR STRATA
                OR STRATUM OR REGION# OR AREA#) OR MQW OR QW OR QUANTUM(W)WELL#
L16             QUE STACK#### OR LAYER#### OR MOUNT? OR PILE
                OR PILED OR MOUND? OR ATTACH?
L17             QUE LED# OR L(W)E(W)D OR LIGHT(W)(EMITT? OR
                EMISSI?) OR LUMINES? OR EL OR ELD OR ELD OR ELECTROLUMIN? OR
                PHOSPHORES? OR SUPERLUMIN? OR OPTOELECT? OR OPTO(W)ELECT? OR
                ELECTROOPTIC? OR PHOTODIODE? OR (PHOTO OR OPTIC OR OPTO)(W)DIODE?
L18             QUE BOND? OR GLUE? OR GLUING OR ADHE########
                OR ATTACH? OR FASTEN? OR AFFIX? OR CONNECT? OR JOIN? OR LINK?
                OR COUPL?
L19             QUE OPTICAL(W)GLASS## OR III-V OR 3-5 OR II-VI
                OR 2-6 OR GROUP(W)(4 OR IV)
L20             QUE NITRIDE#(L)(SEMICONDUCTOR# OR SEMI(W)CONDUCTOR#)
L21             QUE (III OR 3 OR A3/PG)(2A)PHOSPHIDE#
L22             QUE (III OR 3 OR A3/PG)(2A)PHOSPHIDE#
L23             QUE (III OR 3 OR A3/PG)(2A)ARSENIDE#
L24             QUE (III OR 3 OR A3/PG)(2A)NITRIDE#
L25             QUE GROUP(W)VA OR A6/PG OR PNICTIDE#
L26 (         1)S US2002030194/PN
L27             SEL PLU=ON  L26 1- IC :       6 TERMS
L28 (         1)S US2002030194/PN
L29             SEL PLU=ON  L28 1- MC :       3 TERMS
L30 (    253165)S (A3/PG(L)A5/PG)
L31 (    207386)S A2/PG(L)A6/PG
L32 (   1358539)S A4/PG
L33 (      4285)S A3/PG(L)A5/PG AND 2/ELC AND 1/NC
L34 (     19339)S A2/PG(L)A6/PG AND 2/ELC AND 1/NC
L35 (     28153)S A4/PG AND 2/ELC AND 1/NC
L36 (     20104)S L33(L)(SEMICONDUCTOR# OR SEMI(W)CONDUCTOR#)
L37 (      1013)S L34(L)(SEMICONDUCTOR# OR SEMI(W)CONDUCTOR#)
L38 (     31402)S L35(L)(SEMICONDUCTOR# OR SEMI(W)CONDUCTOR#)
L39             QUE L13 OR ELEMENT#
L40         221 S L39 AND L12 AND L18 AND L17 AND L16


FILE 'REGISTRY' ENTERED AT 08:40:45 ON 10 MAR 2004
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L41         4287 S A3/PG(L)A5/PG AND 2/ELC AND 1/NC
L42        19339 S A2/PG(L)A6/PG AND 2/ELC AND 1/NC
L43        28155 S A4/PG AND 2/ELC AND 1/NC

     FILE 'HCAPLUS' ENTERED AT 08:40:53 ON 10 MAR 2004
L44           53 S L40 AND (L41 OR L42 OR L43)
     FILE 'HOME' ENTERED AT 08:45:23 ON 10 MAR 2004

     FILE 'HCAPLUS' ENTERED AT 09:25:23 ON 10 MAR 2004
L45              QUE NITRIDE#(L)(SEMICONDUCTOR# OR SEMI(W)CONDUCTOR#)
L46              QUE (III OR 3 OR B OR BORON OR AL OR ALUMINUM
                 OR GA OR GALLIUM OR INDIUM OR TL OR TELLURIUM)
L47              QUE L46(2A)PHOSPHIDE#
L48              QUE L46(2A)PHOSPHIDE#
L49              QUE L46(2A)ARSENIDE#
L50              QUE L46(2A)NITRIDE#
L51              QUE OPTICAL(W)GLASS## OR III-V OR 3-5 OR II-VI
                 OR 2-6 OR GROUP(W)(4 OR IV)
L52           45 S (L45 OR L46 OR L47 OR L48 OR L49 OR L50 OR L51) AND L44
L53           61 S L13 AND L12 AND L18 AND L17 AND L16
L54           36 S L53 AND ((L41 OR L42 OR L43) OR (L45 OR
                 L46 OR L47 OR L48 OR L49 OR L50 OR L51))
L55           24 S L54 NOT P/DT NOT PY>2000
L56            9 S L54 NOT L55 NOT PRD>20000912
L57           33 S (L55 OR L56)
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     FILE 'INSPEC' ENTERED AT 12:45:38 ON 10 MAR 2004
L1       796458 SEA BORON OR AL OR ALUMINUM OR GA OR GALLIUM
                OR INDIUM OR TL OR TELLURIUM
L2       862728 SEA PHOSPHIDE# OR NITRIDE# OR ARSENIDE# OR P
                OR N OR AS
L3       140618 SEA L1(2A)L2
L4        91242 SEA HEMI? OR FRENEL? OR FRESNEL? OR ELLIPSOID?
                OR LENS## OR OPTIC?(2A)ELEMENT#
L5          970 SEA L3 AND L4
L6       954309 SEA (EFFIC####### OR ABILIT### OR OPTIM?)
L7          263 SEA L5 AND L6

     FILE 'HOME' ENTERED AT 12:48:41 ON 10 MAR 2004

     FILE 'INSPEC' ENTERED AT 12:50:21 ON 10 MAR 2004
L8       267293 SEA OPTICAL(W)GLASS## OR III-V OR 3-5 OR II-VI
                OR 2-6 OR GROUP(W)(4 OR IV)
L9          569 SEA L8 AND L4 AND L6
L10         603 SEA L7 OR L9
L11      110174 SEA (ACTIVE OR SEMICONDUCT? OR SEMI(W)CONDUCT?)
                (2A)(LAYER# OR STRATA OR STRATUM OR REGION# OR AREA#) OR MQW
                OR QW OR QUANTUM(W)WELL#
L12          81 SEA L10 AND L11
L13          70 SEA L12 NOT PY>2000
L14      654247 SEA STACK#### OR LAYER#### OR MOUNT? OR PILE
                OR PILED OR MOUND? OR ATTACH?
L15          33 SEA L13 AND L14
L16       22970 SEA SUPERSTRATE# OR SUPER(W)STRATE# OR
                (TOPMOST OR EMITT? OR EMMISS? OVER OR TOP OR UPPER? OR
                TRANSPAREN?)(2A)(LAYER OR STRATUM OR REGION OR AREA OR WINDOW)
L17           1 SEA L15 AND L16
L18          32 SEA L15 NOT L17

     FILE 'WPIX' ENTERED AT 12:56:59 ON 10 MAR 2004
L19          18 SEA L15 NOT L17
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L52 ANSWER 8 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:138479 HCAPLUS
TI Integration of CMOS process-compatible **optoelectronic** interconnects for high-speed communications
AU Chen, Ray T.; Zhang, Xuping; Liu, Yujie; Lin, Lei; Choi, G.
CS Microelectronics Research Center, Department of Electrical and Computer Engineering, University of Texas at Austin, Austin, TX, 78758, USA
SO Proceedings of SPIE-The International Society for Optical Engineering
F41 X (2001), 4602(Semiconductor Optoelectronic Device Manufacturing and Applications), 23-27
CODEN: PSISDG; ISSN: 0277-786X
PB SPIE-The International Society for Optical Engineering
AB The design and integration of a fully embedded Si-CMOS process-compatible optical interconnects are presented. The transmitting and receiving functions will be incorporated within the embedded **optoelectronic** interconnection **layers** of **3**-dimensional integrated multilayer boards and ASICs. All **elements** including waveguide, **coupler**, detector and laser for the fully embedded board-level optical interconnection system are developed. The propagation loss of waveguide is 0.58 dB/cm at 632.8 nm and 0.21 dB/cm at 850 nm. The 45-degree TIR (total internal reflection) micro-mirror **couplers** with high **coupling efficiencies** are formed by reactive ion etching. The MSM (metal-semiconductor-metal) photo-detector array is fabricated on a GaAs wafer by a CMOS compatible technique. The external quantum **efficiency** of 0.4 A/W and **3** dB bandwidth of the integrated MSM photo-detector of 2.648 GHz are exptl. confirmed. The VCSEL array with a sacrificial **layer** for the epitaxial liftoff of VCSEL from the GaAs substrate is designed and manufactured A 1 X 12 array of VCSELs, MSM photodetectors and polyimide channel waveguides via 45-degree TIR micro-**couplers** are integrated on Si wafer. The exptl. performances of the highly integrated system are given.
IT **1303-00-0, Gallium arsenide,** uses 7440-21-3, Silicon, uses 106070-12-6, **Aluminum gallium arsenide** (Al0.15Ga0.85As) 107121-46-0, **Aluminum gallium arsenide** (Al0.9Ga0.1As)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(integration of CMOS process-compatible **optoelectronic** interconnects for high-speed communications)
IT **1303-00-0, Gallium arsenide,** uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(integration of CMOS process-compatible **optoelectronic** interconnects for high-speed communications)

L52 ANSWER 11 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:770340 HCAPLUS
TI 880-nm surface-emitting microcavity **light-emitting** diode
AU Ochoa, Daniel; Stanley, Ross P.; Houdre, Romuald; Ilegems, Marc; Hanke, Christian; Borchert, Bernd
SO Proceedings of SPIE-The International Society for Optical Engineering (2001), 4278 (Light-Emitting Diodes: Research, Manufacturing, and Applications V), 70-80
CODEN: PSISDG; ISSN: 0277-786X
PB SPIE-The International Society for Optical Engineering
AB Microcavity **light emitting** diodes (MCLEDs) are planar emitting devices that can achieve large brightness increase compare to conventional **LEDs**. The authors designed and fabricated a GaAs/AlxGa1-xAs surface-emitting MCLED emitting at 880 nm. Two InGaAs quantum wells are included in a λ-Al0.3Ga0.7As cavity between 2 Al0.1Ga0.9As/Al0.8Ga0.2As Bragg mirrors. The top n-doped Bragg mirror has 4 pairs, the bottom 1 is p-doped like the substrate and has 20 pairs. The detuning between the source emission wavelength and the Fabry Perot wavelength is -20 nm. It is **optimum** for an extraction into air. By inserting the **bonded** MCLED device into an integration sphere the authors measured a maximum external quantum **efficiency** of 14% at 10 mA. An epoxy **lens** is placed on top of the device and the external quantum **efficiency** is increased up to 20.5% at 10 mA. These values are in good agreement with theor. calcns. if the internal quantum **efficiency** of the structure is 85%. Addnl. calcns. and measurements are performed and lead to a good phys. understanding of the MCLED.
ST quantum well near IR **LED** microcavity semiconductor Bragg mirror; **aluminum gallium arsenide** near IR **LED** microcavity Bragg mirror; **indium gallium arsenide** near IR **LED** microcavity Bragg mirror
IT **Electroluminescent** devices
(IR; 880-nm surface-emitting microcavity **light-emitting** diode)
IT **1303-00-0, Gallium arsenide,** uses
37382-15-3, **Aluminum gallium arsenide** (Al0-1Ga0-1As)
RL: DEV (Device component use); USES (Uses)
(880-nm surface-emitting microcavity **light-emitting** diode)
IT 106218-95-5, **Aluminum gallium arsenide** (Al0.1Ga0.9As) 106312-10-1, **Aluminum gallium arsenide** (Al0.8Ga0.2As)
RL: DEV (Device component use); USES (Uses)
(Bragg mirror component; 880-nm surface-emitting microcavity **light-emitting** diode)
IT 106312-09-8, **Aluminum gallium arsenide** al0.2ga0.8as
RL: DEV (Device component use); USES (Uses)
(electronic lateral diffusion **layer**; 880-nm surface-emitting microcavity **light-emitting** diode)
IT 106070-09-1, **Aluminum gallium arsenide** (Al0.3Ga0.7As)
RL: DEV (Device component use); USES (Uses)
(optical microcavity; 880-nm surface-emitting microcavity **light-emitting** diode)
IT 111242-86-5, **Gallium indium arsenide** ga0.94in0.06as
RL: DEV (Device component use); USES (Uses)
(quantum well **LED**; 880-nm surface-emitting microcavity **light-emitting** diode)
IT **1303-00-0, Gallium arsenide,** uses
RL: DEV (Device component use); USES (Uses)
(880-nm surface-emitting microcavity **light-emitting** diode)

L52 ANSWER 12 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:64300 HCAPLUS
TI Silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration
IN Fonstad, Clifton G., Jr.; London, Joanna M.; Ahadian, Joseph F.
PA Massachusetts Institute of Technology, USA
PI US 6455398 B1 20020924 US 2000-616456 20000714
PRAI US 1999-144114P P 19990716
AB In a method for **bonding** a Si substrate to a **III- V** material substrate, a Si substrate is contacted together with a **III-V** material substrate and the contacted substrates are annealed at a 1st temperature that is above ambient temperature, e.g. at a temperature of .apprx.150 to .apprx.350°. The Si substrate is then thinned. This **bonding** process enables the fabrication of thick, strain-sensitive and defect-sensitive **optoelectronic** devices on the **optimum** substrate for such, namely, a thick **III- V** material substrate, while enabling the fabrication of Si electronic devices in a thin Si **layer**, resulting from the thinned Si substrate, that is sufficient for such fabrication but which was thinned to eliminate thermally-induced stress in both the Si and **III-V** materials. The **III-V** material substrate thickness thereby provides the phys. strength of the composite substrate structure, while the thinned Si substrate minimizes stress in the composite structure.
IC ICM H01L021-00
ST **optoelectronic** integrated circuit fabrication **joining** silicon IIIA pnictide
IT Borophosphosilicate glasses
Borosilicate glasses
Silicate glasses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)
IT **Nitrides**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in silicon on **III-V semiconductor bonding** for monolithic **optoelectronic** integration)
IT Group IIIA **element** pnictides
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)
IT Etching
(sputter, reactive; in silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)
IT 64-19-7, Acetic acid, uses 7664-39-3, Hydrogen fluoride, uses 7697-37-2, Nitric acid, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(etchant; in silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)
IT **7631-86-9,** Silica, uses **12033-89-5,** Silicon **nitride,** uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in silicon on **III-V semiconductor bonding** for monolithic **optoelectronic** integration)
IT **1303-00-0, Gallium arsenide,** uses 7440-21-3, Silicon, uses 37382-15-3, **Aluminum gallium arsenide ((Al,Ga)As)** 106070-25-1, **Gallium indium arsenide**

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)

IT **22398-80-7, Indium phosphide,** uses 107498-92-0, **Gallium indium arsenide** (Ga0.8In0.2As)
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)

IT **7631-86-9,** Silica, uses **12033-89-5,** Silicon **nitride,** uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in silicon on **III-V semiconductor bonding** for monolithic **optoelectronic** integration)

RN 12033-89-5 HCAPLUS

CN Silicon nitride (Si3N4) (8CI, 9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **1303-00-0, Gallium arsenide,** uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)

IT **22398-80-7, Indium phosphide,** uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(silicon on **III-V** semiconductor **bonding** for monolithic **optoelectronic** integration)

L52 ANSWER 13 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:735909 HCAPLUS
TI Micromachined optical concentrators for IR **LEDs**
AU Nash, Geoff R.; Ashley, Tim; Dutton, David T.; Gordon, Neil T.; Phillips,T. J.
CS Defence Evaluation and Research Agency, Malvern, WR14 3PS, UK
SO Proceedings of SPIE-The International Society for Optical Engineering
FYI X(2000), 4179(Micromachining Technology for Micro-Optics), 117-122
CODEN: PSISDG; ISSN: 0277-786X
PB SPIE-The International Society for Optical Engineering
AB One of the most important factors limiting the optical **efficiency** of **LEDs** is total internal reflection of generated light, where photons incident to the surface at angles greater than the critical angle are reflected back into the semiconductor and absorbed. Most semiconductors have a large refractive index and hence a small critical angle. Narrow gap semiconductors, such as InSb, have particularly large refractive indexes and corresponding smaller critical angles. Addnl., strong absorption of light in the **3-5** μm range means that epoxy immersion **lenses**, which are used for GaAs Ir **LEDs**, cannot be used in InSb based IR **LEDs**. The authors have therefore used a novel micromachining technique to fabricate optical concentrators in InSb and HgCdTe **layers**. Inductively **coupled** plasma (ICP) etching is used to alternatively etch the resist mask and the semiconductor, with O and methane/H, resp., producing concentrators with parabolic profiles. Continuing **optimization** of the process to reach the theor. limits of optical gain is described together with some of the main issues associated with the fabrication process.
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 36
ST semiconductor **LED** IR concentrator ICP etching; cadmium mercury telluride **LED** IR concentrator ICP etching; **indium arsenide** **LED** IR concentrator ICP etching; inductively **coupled** plasma etching semiconductor **LED** IR concentrator; polymer protective film photoresist ICP etching semiconductor
IT 1306-25-8, Cadmium telluride, uses
RL: NUU (Other use, unclassified); USES (Uses)
(buffer **layer**; micromachined optical concentrators for IR **LEDs**)
IT **1312-41-0, Indium** antimonide (InSb) 29870-72-2, Cadmium mercury telluride
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(micromachined optical concentrators for IR **LEDs**)

Component	Ratio	Component Registry Number
In	1	7440-74-6
Sb	1	7440-36-0

IT **1303-00-0, Gallium arsenide,** uses
RL: NUU (Other use, unclassified); USES (Uses)
(substrate; micromachined optical concentrators for IR **LEDs**)

L52 ANSWER 20 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:216637 HCAPLUS
TI Design and fabrication of a waveguide **photodiode** for 1.55-μm-band access receivers
AU Takeuchi, Takeshi; Nakata, Takeshi; Tachigori, Masashi; Makita, Kikuo; Taguchi, Kenko
SO Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes & Review Papers (1999), 38(2B), 1211-1214
CODEN: JAPNDE; ISSN: 0021-4922
PB Japanese Journal of Applied Physics
AB A waveguide **photodiode** that can be used in 1.55-μm-band access receivers was designed and fabricated. The authors simulated the optical **coupling** characteristics, focusing especially on those related to the input spot size and for waveguide-**layer** structure. Both high **efficiency** and high tolerance can be obtained in an **optimized** sym. structure used with a **hemispherically** ended fiber. The fabricated device, **optimized** from the simulation, showed excellent characteristics such as an external quantum **efficiency** of >95% and a **coupling** tolerance of 6.5 μm in the vertical direction.
IT 106070-25-1, **Gallium indium arsenide**
RL: DEV (Device component use); USES (Uses)
(absorption **layer**; design and fabrication of **aluminum indium gallium arsenide** waveguide **photodiode** for 1.55-μm-band access receivers)
IT 106070-22-8, **Aluminum gallium indium arsenide** ((**Al**,**Ga**,In)As)
RL: DEV (Device component use); USES (Uses)
(guide **layer**; design and fabrication of **aluminum indium gallium arsenide** waveguide **photodiode** for 1.55-μm-band access receivers)
IT **12033-89-5**, Silicon nitride, uses
RL: DEV (Device component use); USES (Uses)
(passivation **layer**; design and fabrication of **aluminum indium gallium arsenide** waveguide **photodiode** for 1.55-μm-band access receivers)
IT **7631-86-9**, Silica, uses
RL: DEV (Device component use); USES (Uses)
(substrate coating; design and fabrication of **aluminum indium gallium arsenide** waveguide **photodiode** for 1.55-μm-band access receivers)
IT **22398-80-7**, **Indium phosphide**, uses
RL: DEV (Device component use); USES (Uses)
(cladding **layer**; design and fabrication of **aluminum indium gallium arsenide** waveguide **photodiode** for 1.55-μm-band access receivers)

L52 ANSWER 44 OF 45 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1972:454034 HCAPLUS
TI Semiconductor device with at least one p-n junction
IN Zschauer, Karl H.; Vogel, Alfred
PA Siemens A.-G.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2045106	C3	19810115		
PRAI	DE 1970-2045106		19700911		

AB The title devices, especially **luminescent** diodes, have 2 semiconductor **layers** formed onto a semiconductor substrate by epitaxial melting in which the melt contains ≥2 doping **elements** at practically constant composition Thus, an AIIIBV semiconductor substrate, preferably a low resistance n-type GaAs **layer,** is provided with an n-type epitaxial **layer** and a p-type epitaxial **layer** by wetting the substrate under a H atmospheric in a GaAs-**Ga** melt at 870° containing 20% Zn and 0.6% Ge. A Zn-doped p+-conducting **layer** is diffused into the resulting **luminescent** diode and the latter **layer** is provided by vapor deposition with a Au-Ge alloy p-contact. A similar Au-Ge patch is deposited on the upper exposed surface of the substrate to serve as a contact for a Au wire lead. The diode is particularly suited for use in **optoelectronic coupling elements** and provides a large increase in the **efficiency** of optical **coupling.**
IC H05B
IT **Electroluminescent** devices
(diodes, from **gallium arsenide** by epitaxial melting in presence of germanium and tin)
IT 7440-31-5, uses and miscellaneous 7440-56-4, uses and miscellaneous
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(doping with, of **gallium arsenide electroluminescent** diodes)
IT **1303-00-0,** uses and miscellaneous
RL: USES (Uses)
(**electroluminescent** diodes from, by epitaxy with melting in presence of germanium and tin)
IT **1303-00-0,** uses and miscellaneous
CN Gallium arsenide (GaAs) (8CI, 9CI) (CA INDEX NAME)
RL: USES (Uses)
(**electroluminescent** diodes from, by epitaxy with melting in presence of germanium and tin)

L19 ANSWER 1 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2001-052282 [07] WPIX
TI Analytical support, useful e.g. for immunological or hybridization assays, comprises analytical sites, each associated with a resonant microcavity for emitting light.
DC B04 D16 J04 L03 S03
IN BESESTY, P; MOLVA, E; PELTIE, P
PA (COMS) COMMISSARIAT ENERGIE ATOMIQUE
PI FR 2793560 A1 20001117 (200107)* 27p FYI
PRAI FR 1999-11165 19990907
AB FR 2793560 A UPAB: 20010202

NOVELTY - Analytical support (A), particularly a biochip, comprises many analytical sites (AS) that can be supplied with reagents and many resonant microcavities (RMC) that can emit light and are associated with AS.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for an analytical system comprising (A), a source of pumping light for RMC and a detector for measuring fluorescence emitted from AS.

USE - (A) is used for performing chemical or biological assays, e.g. antigen-antibody or nucleic acid hybridization tests, particularly for medical, health or pharmacological applications.

ADVANTAGE - (A) can be used with inexpensive excitation light sources (e.g. a broad-spectrum mercury lamp) that is adapted to all types of labels. Light emission from AS is more intense, better directed and has a narrower spectral width compared with light emitted from conventional supports, and it can be detected without being disturbed by the excitation light. Since RMC are integrated into the support, exact positioning of (A) in the illumination device is not required, because alignment between AS and RMC is produced during manufacture of the support. The support is disposable because thin-film coating methods make it possible to manufacture MRC very cheaply.

TECH UPTX: 20010202

TECHNOLOGY FOCUS - INSTRUMENTATION AND TESTING - Preferred Support: This comprises a first surface, with AS, and an opposing surface that receives pumping light for transmission to RMC. Particularly the opposing surface has a network of microlenses, each of which is associated with at least one RMC. These **lenses** concentrate the light so improve the **efficiency** of pumping. Particularly the support comprises a **stack** formed from, a transparent strip, containing AS, an **active layer** containing RMC and a network of **lenses**. Each RMC has an entry side, for taking in light and an opposing side for directing excitation light towards AS, with both sides equipped with mirrors. The mirrors may be made of multilayer construction, e.g. of **aluminum nitride-gallium nitride**, or silica-titania etc., or a semiconducting material (e.g. cadmium-mercury telluride, **gallium-aluminum nitride** etc.) is placed between the mirrors. Alternatively, the support comprises a substrate **with many wells** on one surface and a second surface defined by a **wall** that forms the base of the wells, a **stack** of **layers**, covering the wells and comprising (from the base of the wells) a first mirror **layer**, forming the entry surface of RMC, at least one **semiconductor layer** forming an **active region**, and a second **layer** of mirrors, forming the exit surface. Each well may also include, above the **stack** of **layers**, at least one chemical or biological reagent, e.g. an oligonucleotide, and the wall forming the base of the wells comprises a network of **lenses**, each centered in one of the wells.

L19 ANSWER 9 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1997-383292 [35] WPIX

TI Semiconductor device - has second **III-V** group **semiconductor layer** formed on predetermined portion of dielectric **layer** over substrate on which **optical element** or electronic element is arranged.

DC U11

PA (NITE) NIPPON TELEGRAPH & TELEPHONE CORP

PI JP 09167739 A 19970624 (199735)* 6p

PRAI JP 1995-326687 19951215

AB JP 09167739 A UPAB: 19970828

The device comprises a substrate (1) on surface of which a first **III-V** group **semiconductor layer** (2) and a dielectric **layer** (3) with an aperture (5) are arranged sequentially. A second **III- V** group **semiconductor layer** (4) is arranged on a predetermined portion of the dielectric **layer.** The 001 plane on the crystal surface of the substrate makes an angle alpha with the 001 crystal plane. The aperture of the dielectric **layer** makes an angle beta with the semiconductor surface.

The aperture of the dielectric **layer** is formed at a predetermined distance from the crystal plane of the substrate. The substrate makes an angle 85-90deg with the aperture of the dielectric **layer.** An **optical element** or an electronic component is arranged on the surface of the second **III-V** group **semiconductor layer.**

ADVANTAGE - Enables easy formation of electronic component or **optical element** on second **III-V** group **semiconductor layer.** Provides highly **efficient** and reliable semiconductor device. Minimises performance degradation of **mounted** component. Dwg.4/6

TT TT: SEMICONDUCTOR DEVICE SECOND GROUP **SEMICONDUCTOR LAYER** FORMING PREDETERMINED PORTION DIELECTRIC **LAYER** SUBSTRATE **OPTICAL ELEMENT** ELECTRONIC **ELEMENT** ARRANGE.

L19 ANSWER 11 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 1995-119454 [16] WPIX
TI Semiconductor laser pumping reflector e.g. for optical fibre or pumping of solid-state laser - collimates perpendicular component of radiation.
DC P81 U12 V07 V08
PA (YAWA) NIPPON STEEL CORP
PI JP 07043643 A 19950214 (199516)* 7p
PRAI JP 1993-207193 19930728
AB JP 07043643 A UPAB: 19950502
The semiconductor laser pumping reflector consists of a distributed refractive index **lens** which has an **optical glass** object. The refractive index is distributed so that is changes along the perpendicular direction to the axis of the **active layer** (21). The **active layer** is formed over the semiconductor laser element (22). The perpendicular component of the radiation light of the semiconductor laser element is collimated.

ADVANTAGE - Obtains **efficient** solid state laser. Improves quality of beam and handles laser light easily. Dwg.4/11

L19 ANSWER 12 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1995-017391 [03] WPIX

TI Semiconductor light receiving element of FET for optical reception - involves formation of **indium-gallium arsenide active layer** above optical wave guide on semiconductor substrate and a optical bond exists between these two **layers**.

DC L03 P81 U12 V07

PA (NITE) NIPPON TELEGRAPH & TELEPHONE CORP

PI JP 06302847 A 19941028 (199503)* 5p

PRAI JP 1993-84250 19930412

The semiconductor light receiving element consists of a InP half insulated semiconductor substrate (1) on which an optical wave guide (2) made of InGaAsP is formed. On this optical wave guide, a two **layer semiconductor** surface (5) is formed. This **semiconductor layer** surface is formed by using a InGaAs **active layer** (3) and a Schottky junction sub-**layer** (4) of FET. A source electrode (7) and drain electrode (8) are formed above the **semiconductor layer**. A gate electrode (6) is formed between the gate and source electrodes. An optical bond exists between the optical wave guide and the **active layers** of the FET.

ADVANTAGE - Improves photon transformation **efficiency** since light is irradiated in **active layers** of FET. Dwg.1/5

TT TT: SEMICONDUCTOR LIGHT RECEIVE **ELEMENT** FET **OPTICAL** RECEPTION FORMATION **INDIUM GALLIUM ARSENIDE ACTIVE LAYER** ABOVE OPTICAL WAVE GUIDE SEMICONDUCTOR SUBSTRATE OPTICAL BOND EXIST TWO **LAYER**.

L19 ANSWER 15 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1984-050962 [09] WPIX

TI Integrated LED and **lens** appts. for fibre-optic communication - has monolithic **gallium arsenide** substrate with seven LEDs and seven **hemispherical lenses.**

DC P81 U12 V07

IN CARBALLES, J C; MESQUIDA, G

PA (CSFC) THOMSON CSF

PI EP 101368 A 19840222 (198409)* FR 7p
JP 59051580 A 19840326 (198418)

PRAI FR 1982-13926 19820810

AB EP 101368 A UPAB: 19930925

An array of e.g. seven microlenses (L1-L7) overlying the **active regions** (E1-E7) of electroluminescent diodes is formed on a substrate (10) of p-GaAs, on which is grown an epitaxial n-type **layer** (11) having a central opening filled with a first confinement **layer** (12). This is covered in succession with a stepped **active layer** (13), a second confinement **layer** (14) and a final contact **layer** (15) with metallised edges (16). The **hemispherical lens** (L) is formed directly in the contact **layer** (15).

The **layer** thicknesses are chosen to establish the **active region** at a distance (d) from the **lens** which depends on the radii of the **lens** (R) and opening (Di), and on the numerical aperture and dia. of the optical fibre to which the device is to be coupled for **optimum** directivity. 1,2/2

TT TT: INTEGRATE LED **LENS** APPARATUS FIBRE-OPTIC COMMUNICATE MONOLITHIC **GALLIUM ARSENIDE** SUBSTRATE SEVEN LED SEVEN **HEMISPHERICAL LENS.**

AW: ALUMINIUM N-TYPE P-TYPE.

L19 ANSWER 16 OF 18 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 1983-E1402K [13] WPIX
TI High output LED - has spherical **lenses** located over circular output apertures.
DC U11 U12
IN HORIUCHI, S; OTAKI, K; YAMANAKA, K
PA (MITQ) MITSUBISHI DENKI KK
PI JP 58039080 A 19830307 (198315)
DE 3232526 C 19870716 (198728)
PRAI JP 1981-138968 19810902
AB DE 3232526 A UPAB: 19930925

The diode gives a strong optical output and is for interfacing with optical fibres. The design has an active P-type GaAs **layer** (14) sandwiched between an N-type AlGaAs **layer** (12) and a P-type AlGaAs **layer** (16) on an N-type GaAs substrate (10). Seven circular cut outs (20-1...20-7) are formed over the **active layer** (14) and have seven spherical **lenses** (24-1...24-7) in packing located over them.

The spherical **lenses** (24-1...24-7) are located over the cutouts (20-1...20-7) and are also located in corresponding apertures in a further electrode (26) set in the packing material. 3B/5

ABEQ DE 3232526 C UPAB: 19930925

The light emitting diode unit has an **N** tyPe **Al**. **Ga**.As **semiconductor layer** (18) that has a number of formed apertures (20) with a circular cross section that receive a number of spherical **lense** elements (24) that are packed togehter. Zinc is then diffused into the **semiconductor layer** to form zones (22).

A P-type electrode (26) and an N-type electrode are formed on the outer surfaces and the current applied is concentrated on the diffusion zones (22). The light emission is **efficiently** directed onto the spherical **lenses** to provide a number of light emitting zones.

ADVANTAGE - Provides high density multiple emission zones.

TT TT: HIGH OUTPUT LED SPHERE **LENS** LOCATE CIRCULAR OUTPUT APERTURE.

L18 ANSWER 2 OF 32 INSPEC (C) 2004 IEE on STN
AN 2000:6539584 INSPEC
TI Optical disk recording using a GaN blue-violet laser diode.
AU Ichimura, I.; Maeda, F.; Osato, K.; Yamamoto, K.; Kasami, Y. (Dev. Center, Sony Corp., Tokyo, Japan)
SO Japanese Journal of Applied Physics, Part 1 (Regular Papers, Short Notes & Review Papers) (Feb. 2000) vol.39, no.2B, p.937-42. 11 refs.
Published by: Publication Office, Japanese Journal Appl. Phys
CODEN: JAPNDE ISSN: 0021-4922
Conference: Joint International Symposium on Optical Memory and Optical Data Storage 1999 (ISOM/ODS'99. Koloa, HI, USA, 11-15 July 1999
AB The combination of a GaN laser diode and a 0.85 numerical aperture objective has achieved an optical storage capacity of over 22 GB. Owing to sufficient modulation **ability** and low-noise characteristics, GaN semiconductor lasers possess adequate quality to be light sources in optical recording systems. A bit size of 130 nm*300 nm, corresponding to the areal recording density of 16.5 Gbit/in.2, was realized on a six- **layered** thin-cover phase-change disk with a crystallization- promoting structure. Each **active layer** was inversely **stacked** and was thermally as well as optically **optimized** for the blue-violet light sources. A new small electromagnetic actuator with a lightweight phi 3 mm two-element **lens** has extended its servo-bandwidth up to 8 kHz and enabled precise focusing control at the data transfer rate of 35 Mbps.
CT ELECTRO-OPTICAL MODULATION; GALLIUM COMPOUNDS; **III-V** SEMICONDUCTORS; LASER NOISE; **LENSES**; OPTICAL DISC STORAGE; OPTICAL FOCUSING; SEMICONDUCTOR LASERS; SOLID-STATE PHASE TRANSFORMATIONS
ST optical disk recording; GaN blue-violet laser diode; numerical aperture objective; optical storage capacity; **modulation ability**; low-noise characteristics; GaN semiconductor lasers; light sources; optical recording systems; areal recording density; **six-layered thin-cover phase-change disk**; crystallization-promoting structure; **inversely stacked**; **active layer**; **optically optimized**; blue-violet light sources; small electromagnetic actuator; **two-element lens**; servo-bandwidth; precise focusing control; data transfer rate; 22 GB; 130 mm; 300 mm; GaN

L18 ANSWER 3 OF 32 INSPEC (C) 2004 IEE on STN
AN 2000:6476665 INSPEC DN A2000-05-4260B-001; B2000-03-4320J-001 Full-text
TI Thermal lensing effects in small oxide confined vertical-cavity surface-emitting lasers.
AU Brunner, M.; Gulden, K.; Hovel, R.; Moser, M. (Centre Suisse d'Electron. et de Microtech. SA, Zurich, Switzerland); Ilegems, M.
SO Applied Physics Letters (3 Jan. 2000) vol.76, no.1, p.7-9. 12 refs.
Doc. No.: S0003-6951(90)01101-9
Published by: AIP
Price: CCCC 0003-6951/2000/76(1)/7(3)/$15.00
CODEN: APPLAB ISSN: 0003-6951
AB The thickness and position of an oxide **layer** inside a vertical-cavity surface-emitting laser structure have been **optimized** for minimum optical scattering loss. In the resulting structure, the index guiding provided by the oxide aperture is very small. Consequently, for an oxide aperture radius <2 mu m, the optical mode is only weakly confined. In devices using such small apertures, the formation of a thermal **lens** has a strong influence on optical guiding. The thermal **lens** leads to lower threshold currents and increased differential **efficiency** with continuous wave as compared to pulsed injection operation in devices with small apertures.
CT **GALLIUM ARSENIDE; III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; OPTICAL LOSSES; **QUANTUM WELL** LASERS; SEMICONDUCTOR **QUANTUM WELLS;** SURFACE EMITTING LASERS; WAVEGUIDE LASERS
ST small oxide confined VCSEL; thermal lensing effects; vertical-cavity surface-emitting lasers; minimum optical scattering loss; index guiding; oxide aperture radius; weakly confined optical mode; threshold currents; **differential efficiency**; continuous wave operation; pulsed injection operation; **InGaAs quantum wells**; 1.2 to 8 mum; InGaAs; Al0.9Ga0.1As-GaAs; Al0.15Ga0.85As

L18 ANSWER 4 OF 32 INSPEC (C) 2004 FIZ KARLSRUHE on STN
AN 1999:6340722 INSPEC
TI **III-V** compounds for solar cell applications.
AU Bett, A.W. (Fraunhofer-Inst. fur Solare Energiesyst., Freiburg, Germany);
Dimroth, F.; Stollwerck, G.; Sulima, O.V.
SO Applied Physics A (Materials Science Processing) (Aug. 1999) vol.A69,
no.2, p.119-29. 75 refs.
Published by: Springer-Verlag
CODEN: APAMFC ISSN: 0947-8396
TI **III-V** compounds for solar cell applications.
AB Research activities in the field of **III-V** solar cells are reviewed. **III-V** compound semiconductors are used for space solar cells, concentrator solar cells, and in thermophotovoltaic generators. The epitaxial growth of ternary and quaternary material by MOVPE and LPE allows us to realize various band gaps. Multi-junction solar cells with different band gaps are necessary to obtain **efficiencies** larger than 30%. Recent results of the **III- V** solar cell research at the Fraunhofer ISE are presented. A mechanically **stacked** GaAs/GaSb tandem concentrator solar cell achieved an **efficiency** of 31.1% under 100*AM1.5d. An **efficiency** of 23% for a two-terminal concentrator module (486 cm2) with **Fresnel lenses** has been measured under realistic outdoor conditions.
CT ALUMINIUM COMPOUNDS; ENERGY GAP; GALLIUM COMPOUNDS; **III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; MOCVD COATINGS; PHOTOVOLTAIC EFFECTS; REVIEWS; **SEMICONDUCTOR** EPITAXIAL **LAYERS**; SEMICONDUCTOR GROWTH; SOLAR CELLS; SOLAR ENERGY CONCENTRATORS; THERMOPHOTOVOLTAIC CELLS; VAPOUR PHASE EPITAXIAL GROWTH
ST solar cells; **III-V semiconductors**; space solar cells; concentrator solar cells; thermophotovoltaic generators; semiconductor epitaxial growth; MOVPE; metal-organic vapour phase epitaxy; review; band gap; multijunction solar cells; **solar cell efficiencies**; photovoltaic effect; 31.1 percent; 23 percent; 100 mbar; 700 C; 380 C; AlGaAs; GaAs-GaSb; GaInP; GaAs

L18 ANSWER 8 OF 32 INSPEC (C) 2004 FIZ KARLSRUHE on STN
AN 1997:5512145 INSPEC DN A9707-8630J-085; B9704-8420-076 Full-text
TI A3B5 based solar cells and concentrating **optical elements** for space PV modules.
AU Andreev, V.M.; Rumyantsev, V.D. (A.F. Ioffe Phys. Inst., Acad. of Sci., St. Petersburg, Russia)
SO Solar Energy Materials and Solar Cells (15 Dec. 1996) vol.44, no.4, p.319-32. 15 refs.
Doc. No.: S0927-0248(96)00049-9
Published by: Elsevier
CODEN: SEMCEQ ISSN: 0927-0248
AB This paper presents briefly the results of the development of AlGaAs/GaAs, InP/InGaAs and GaSb cells manufactured for tandem solar cells, as well as tandems designed for point and line-focus concentrator modules. The maximum **efficiency** 23-23.8% (25 degrees C, AM0) under 20-100 suns has been reached in the infrared transparent AlGaAs/GaAs cells with prismatic cover. The **efficiency** 27.5% under AM1.5, 140 suns conditions has been reached as well. The bottom cells are based on lattice-matched InP/InGaAs or GaSb homo-junction Zn-diffused structures. The summation of the highest **efficiencies** measured in the top and bottom cells gave the values 28.8%-29.4% (AM0, 20-70 suns, 25 degrees C) and 33.2% (AM1.5, 100 suns, 30 degrees C). Two types of concentrator photovoltaic modules employing the reflective **optical elements** have been developed. The first type is based on compound parabolic concentrators, the second one on line-focus parabolic troughs. The estimated specific parameters of these modules with single-junction AlGaAs/GaAs solar cells are the following: 230-240 W.m-2 (AM0) and 3 kg.m-2. The usage of tandem cells will allow to increase specific power of these modules on the value of 20-25%.
CT ALUMINIUM COMPOUNDS; DIFFUSION; **GALLIUM ARSENIDE**; GALLIUM COMPOUNDS; **III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; INFRARED SPECTRA; LIQUID PHASE EPITAXIAL GROWTH; PROTECTIVE COATINGS; **SEMICONDUCTOR** EPITAXIAL **LAYERS**; SEMICONDUCTOR GROWTH; SOLAR CELLS; VISIBLE SPECTRA
ST solar cells; **concentrating optical elements**; space PV modules; tandem solar cells; concentrator modules; **maximum efficiency**; infrared transparent cells; homojunction diffused structures; **reflective optical elements**; compound parabolic concentrators; LPE; 23 to 23.8 percent; 28.8 to 29.4 percent; AlGaAs-GaAs; InP-InGaAs; GaSb

L18 ANSWER 9 OF 32 INSPEC (C) 2004 IEE on STN
AN 1997:5500548 INSPEC DN B9703-6260-238 Full-text
TI High optical coupling scheme in LD modules with silicon platform technology.
AU Tanaka, K.; Sasaki, S.; Nakagawa, G.; Yamamoto, T.; Miura, K.; Ogita, S.; Yano, M. (Fujitsu Labs. Ltd., Atsugi, Japan)
SO IEICE Transactions on Electronics (Jan. 1997) vol.E80-C, no.1, p.107-11. 13 refs.
Published by: Inst. Electron. Inf. & Commun. Eng
CODEN: IELEEJ ISSN: 0916-8524
AB Laser module fabricated with silicon platform technology is very attractive for low-cost modules. The technology enables passive optical alignment of an LD to an optical fiber. Our marker design for passive alignment allows positioning accuracy within +or-1 mu m of LD. However, coupling **efficiency** is a key issue because that by conventional butt coupling scheme is low with about 10 dB coupling loss. We investigated optical coupling characteristics in various types of coupling scheme: conventional flat end fibers, cone fibers, integrated GRIN rod **lenses** on the platform and the coupling with new-type LDs integrated with spot size transformer. Improvement of coupling **efficiency** with 3 dB and 7.5 dB compared to flat-end fiber is achieved by using the cone fiber and the GRIN rod **lens**, respectively, although 1-dB coupling tolerances for alignment deteriorated with these schemes. We obtained high **efficient** coupling with **3.5** dB coupling loss and wide alignment tolerance of +or-2.3 mu m simultaneously with a new-type LD integrated with spot size transformer owing to its expanded spot size characteristics.
CT FLIP-CHIP DEVICES; GRADIENT INDEX OPTICS; INTEGRATED OPTOELECTRONICS; MODULES; OPTICAL COMMUNICATION EQUIPMENT; OPTICAL FIBRE COUPLERS; OPTICAL FIBRE SUBSCRIBER LOOPS; OPTICAL INTERCONNECTIONS; OPTICAL PLANAR WAVEGUIDES; SEMICONDUCTOR DEVICE PACKAGING; SEMICONDUCTOR LASERS; SURFACE **MOUNT** TECHNOLOGY; WAVEGUIDE LASERS
ST high optical coupling scheme; LD modules; Si platform technology; low-cost modules; passive optical alignment; optical fiber; marker design; positioning accuracy; **coupling efficiency**; flat end fibers; cone fibers; **integrated GRIN rod lenses**; spot size transformer; wide alignment tolerance; expanded spot size characteristics; optical access networks; optical fiber communication; laser chip positioning; mesa structure; chip bonding; micro-optics; SMT; **BH MQW laser**; **3.5 dB**; Si

L18 ANSWER 14 OF 32 INSPEC (C) 2004 IEE on STN
AN 1994:4760805 INSPEC DN B9410-4250-023 Full-text
TI A high speed flip-chip PIN photodetector with integrated micro-**lens**.
AU Tan, T.S.; Kocot, C.; Straznicky, J.; Kaneshiro, R.T.; Kellert, F.
SO Proceedings of the SPIE - The International Society for Optical Engineering (1994) vol.2149, p.328-35. 4 refs.
CODEN: PSISDG ISSN: 0277-786X
Conference: Technologies for Optical Fiber Communications. Los Angeles, CA, USA, 25 Jan 1994
Sponsor(s): SPIE
TI A high speed flip-chip PIN photodetector with integrated micro-**lens**.
AB The design of high-speed, high responsivity PIN optical detectors for fiber optic telecommunication test equipment requires a very careful trade-off between lateral and vertical **active area** dimensions. A thin absorption **layer** (i-**layer**) leads to high bandwidth at the expense of responsivity. A large area device improves light coupling **efficiency** from a fiber, but reduces the bandwidth. In addition, packaging constraints must be considered. Our approach attempts to **optimize** the end-system performance by incorporating an integral micro-**lens** which increases the effective light collection area; a double-pass illumination strategy that increases the bandwidth without sacrificing responsivity; and a micro-flip-chip die **attachment** technology that minimizes parasitic capacitance and inductance. An optical receiver composed of a GaAs MODFET-based transimpedance amplifier and a flip-chip PIN photodetector exhibited a bandwidth of 7.2 GHz with an optical-to-electrical conversion gain of 560 V/W.
CT FLIP-CHIP DEVICES; **GALLIUM ARSENIDE**; HIGH ELECTRON MOBILITY TRANSISTORS; **III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; INTEGRATED OPTOELECTRONICS; **LENSES**; OPTICAL RECEIVERS; P-I-N PHOTODIODES; PHOTODETECTORS
ST high speed flip-chip PIN photodetector; **integrated micro-lens**; high responsivity; fiber optic telecommunication test equipment; **thin absorption layer**; **lateral/vertical active area dimensions**; **i-layer**; high bandwidth; responsivity; large area device; **light coupling efficiency**; packaging constraints; **optimal end-system performance**; effective light collection area; double-pass illumination strategy; **micro-flip-chip die attachment technology** ; optical receiver; parasitic capacitance/inductance; GaAs MODFET-based transimpedance amplifier; 560 V/W optical-to-electrical conversion gain; InGaAs-based PIN photodiodes; 15 micron; 7.2 GHz; GaAs; InGaAs

L18 ANSWER 22 OF 32 INSPEC (C) 2004 IEE on STN
AN 1987:2919137 INSPEC DN A87085584 Full-text
TI Refractive index of GaInAsP solid solutions at the lasing wavelength.
AU Fronts, K.; Maiorova, N.I.; Mishurnyi, V.A.; Kuchinskii, V.I.; Portnoi, E.L.; Smirnitskii, V.B. (A.F. Ioffe Physicotech. Inst., Acad. of Sci.,
SO Soviet Technical Physics Letters (July 1986) vol.12, no.7, p.342-3. 4 refs.
CODEN: STPLD2 ISSN: 0360-120X
Translation of: Pis'ma v Zhurnal Tekhnicheskoi Fizika (July 1986) vol.12, no.13-14, p.827-31. 4 refs.
CODEN: PZTFDD ISSN: 0320-0108

AB GaInAsP solid solutions which are lattice-matched with InP are primary materials for lasers and integrated-**optics elements** for the spectral intervals corresponding to the **optimum** conditions for light propagation through an optical fiber (lambda =1.3 mu m corresponds to the minimum of the chromatic dispersion in quartz fibers, while lambda =1.55 mu m corresponds to the minimum of the optical loss in these fibers). The development of laser sources and integrated-**optics elements** from GaInAsP/InP heterostructures requires knowing the refractive index and its dependence on the wavelength. The authors report measurements of the refractive index of a GaInAsP **active layer** at the wavelength of generation under stimulated-emission conditions. In taking this approach, they are thus automatically taking into account not only the effect of the composition of the **layer** on its refractive index but also the effect on the refractive index due to the high density of nonequilibrium current carriers corresponding to a population inversion.

CT **GALLIUM ARSENIDE**; GALLIUM COMPOUNDS; **III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; REFRACTIVE INDEX
ST lasing wavelength; lattice-matched; **integrated-optics elements**; spectral intervals; light propagation; laser sources; heterostructures; stimulated-emission; nonequilibrium current carriers; 1.3 micron; 1.55 micron; GaInAsP; InP

L18 ANSWER 25 OF 32 INSPEC (C) 2004 IEE on STN
AN 1985:2357871 INSPEC DN A84112407; B85002279 Full-text
TI High-power, low-threshold, single-mode GaInAsP/InP laser by low-temperature, single-step liquid phase epitaxy.
AU Horikawa, H.; Imanaka, K.; Matoba, A.; Kawai, Y.; Sakuta, M. (Res. Lab.,
SO Applied Physics Letters (15 Aug. 1984) vol.45, no.4, p.328-30. 7 refs.
Price: CCCC 0003-6951/84/160328-03$01.00
CODEN: APPLAB ISSN: 0003-6951
AB A GaInAsP/InP laser (lambda g=1.3 mu m) on grooved substrate with a **lens**-shaped **active layer**, in which the current blocking junction is grown exclusively outside of the groove, has been fabricated by single-step liquid phase epitaxy. This technique is based on the preferential growth effects of InP and GaInAsP on the (100) oriented substrate with (011) directed grooves. Under CW operation, low threshold current (38 mA), high output power (40 mW/facet), and high external differential quantum **efficiency** (56%) are accomplished; fundamental transverse mode operation up to an output of 30 mW/facet is verified. These successful characteristics are realized by the introduction of the inner current confining **layer**.
CT **GALLIUM ARSENIDE; III-V**
SEMICONDUCTORS; INDIUM COMPOUNDS; LIQUID PHASE EPITAXIAL GROWTH; SEMICONDUCTOR GROWTH; SEMICONDUCTOR JUNCTION LASERS
ST high power; low-threshold; single-mode GaInAsP/InP laser; low-temperature; single-step liquid phase epitaxy; **lens-shaped active layer**; current blocking junction; CW; **differential quantum efficiency**; fundamental transverse mode; **inner current confining layer**

L18 ANSWER 27 OF 32 INSPEC (C) 2004 IEE on STN
AN 1983:2033706 INSPEC DN B83025103 Full-text
TI A 1.27 mu m **lensed** LED **optimised** for 34-140 Mbits/s systems using 50 mu m core diameter and 0.2 numerical aperture graded index fibre.
AU Benoit, J.; Matabon, M. (Lab. de Marcoussis, Marcoussis, France)
SO European Conference on Optical Communication
Paris, France: Conference Europeenne sur les Communications Optiques, 1982. p.359-64 of xxxi+651 pp. 12 refs.
Conference: Cannes, France, 21-24 Sept 1982
TI A 1.27 mu m **lensed** LED **optimised** for 34-140 Mbits/s systems using 50 mu m core diameter and 0.2 numerical aperture graded index fibre.
AB An **optimization** of 1.27 mu m LED designed for the coupling to graded index fibers with a 50 mu m core diameter and a 0.2 numerical aperture is presented. These LEDs are designed for 34 Mbits/s and 140 Mbits/s systems. The **optimization** is obtained for a detailed investigation of various physical parameters: **active layer** thickness and doping, driving current density diode diameter . . . and by using a new type of **lens** made 'in situ' with a high refractive index (n=**2.6**) low melting point glass. The DC power launched into the above defined fibers is typically 50 mu W for a 34 Mbits/s LED and 30 mu W for a 140 Mbits/s LED.
CT **GALLIUM ARSENIDE; III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; **LENSES**; LIGHT EMITTING DIODES; LIGHT SOURCES; OPTICAL COMMUNICATION EQUIPMENT; OPTICAL FIBRES
ST **1.27 micron lensed LED optimisation; III-V semiconductors**; 34 to 140 megabit per second systems; graded index fibre; coupling to graded index fibers; **active layer thickness**; doping; driving current density; diode diameter; **lens**; refractive index; DC power

L18 ANSWER 28 OF 32 INSPEC (C) 2004 IEE on STN

AN 1981:1720755 INSPEC DN A81068496; B81037100 Full-text

TI Single-mode positive-index guided CW constricted double-heterojunction large-optical-cavity AlGaAs lasers with low threshold-current temperature sensitivity.

AU Botez, D.; Connolly, J.C. (RCA Labs., Princeton, NJ, USA)

SO Applied Physics Letters (1 May 1981) vol.38, no.9, p.658-60. 19 refs.
CODEN: APPLAB ISSN: 0003-6951

AB A new type of constricted double-heterojunction large-optical-cavity (CDH-LOC) laser is obtained by growing relatively thick (0.2-0.3 mu m) convex-**lens**-shaped **active layers** above concave-**lens**-shaped guide **layers**. By using the effective-index method is is shown that the resultant lateral waveguide is of the positive-index type. The device reproducibly provides single-mode CW laser operation (10 mW CW and 20 mW pulsed) in narrow single-lobed beams (theta //=8 degrees ; theta perpendicular to =30 degrees), and displays very high threshold-current temperature coefficients, (T0 equivalent to 135 degrees C, pulsed and CW) for LOC-type structures. The CW threshold currents and differential quantum **efficiencies** (one facet) are between 60-70 mA and 30-35%, respectively. The performance of the 'positive index' CDH-LOC laser is discussed in view of results from the previously reported 'leaky cavity' CDH-LOC laser.

CT ALUMINIUM COMPOUNDS; **GALLIUM ARSENIDE**; **III-V** SEMICONDUCTORS; LASER CAVITY RESONATORS; LASER MODES; OPTICAL WAVEGUIDES; SEMICONDUCTOR JUNCTION LASERS

ST positive-index; guided CW constricted double-heterojunction; large-optical-cavity; AlGaAs lasers; low threshold-current temperature sensitivity; **convex-lens-shaped active layers**; **concave-lens-shaped guide layers**; effective-index method; lateral waveguide; single-mode CW laser operation; narrow single-lobed beams; CW threshold currents; **differential quantum efficiencies**; single mode

L18 ANSWER 29 OF 32 INSPEC (C) 2004 IEE on STN

AN 1981:1694340 INSPEC DN B81028595 Full-text

TI An experimental study on improvement of performance for **hemispherically** shaped high-power IREDs with Ga1-xAlxAs grown junctions.

AU Kurata, K.; Ono, Y.; Ito, K.; Mori, M.; Sano, H. (Central Res. Lab.,

SO IEEE Transactions on Electron Devices (April 1981) vol.ED-28, no.4, p.374-9.
CODEN: IETDAI ISSN: 0018-9383

TI An experimental study on improvement of performance for **hemispherically** shaped high-power IREDs with Ga1-xAlxAs grown junctions.

AB Describes the structure and performance of a high-power infrared emitting diode (IRED) designed as a high speed optical beam source for optoelectronic applications. The heterostructured junction is formed on a thick Ga1-xAlxAs LPE grown **layer** which is used to shape **hemispherical** emitting surfaces. Dislocation density in recombination region was considerably decreased by the thick **layer** growth on a GaAs wafer substrate. Under DC operations, external quantum **efficiencies** of around 45 percent at a current density of 0.6 kA/cm2 and about 110 mW of optical output power at 200 mA (1 kA/cm2) have been obtained from the diodes with a 160- mu m junction diameter. The tendency to reach power saturation with increased current has been decreased by means of reducing of thermal resistance of the **mount** , and the diodes with 240- mu m junction diameter have shown about 180 mW at 600 mA DC and 1.4 W at a 4-A pulse (60 Hz, 50 mu s). A large improvement in high frequency response has been obtained and the bandwidth at -3-dB intensity has reached above 120 MHz.

CT **GALLIUM ARSENIDE; III-V** SEMICONDUCTORS; INFRARED SOURCES; LIGHT EMITTING DIODES; LIQUID PHASE EPITAXIAL GROWTH; **SEMICONDUCTOR** EPITAXIAL **LAYERS**

ST performance; **hemispherically shaped high-power IREDs**; Ga1-xAlxAs grown junctions; structure; high-power infrared emitting diode; high speed optical beam source; heterostructured junction; **Ga1-xAlxAs LPE grown layer**; GaAs wafer substrate; current density of 0.6 kA/cm2; high frequency response; IR LED; bandwidth 120 MHz; **external quantum efficiency 45%**; optical output power 110 mW; thermal resistance reduction

L18 ANSWER 30 OF 32 INSPEC (C) 2004 IEE on STN

AN 1981:1681477 INSPEC DN B81024508 Full-text

TI High radiance InGaAsP/InP **lensed** LEDs for optical communication systems at 1.2-1.3 mu m.

AU Wada, O.; Yamakoshi, S.; Abe, M.; Nishitani, Y.; Sakurai, T.

SO IEEE Journal of Quantum Electronics (Feb. 1981) vol.QE-17, no.2, p.174-8.
CODEN: IEJQA7 ISSN: 0018-9197

TI High radiance InGaAsP/InP **lensed** LEDs for optical communication systems at 1.2-1.3 mu m.

AB The fabrication of high radiance InGaAsP/InP double-heterostructure (DH) surface-emitting LEDs at 1.27 mu m wavelength has been described. The elimination of the junction misplacement as well as the **optimization** of the **active layer** thickness has been found to be important in realizing high quantum **efficiency**. An ideal DH, free from the junction misplacement, has been fabricated by using Cd as the dopant in the InP carrier confining **layer**. The **active layer** thickness for maximum output power has been determined to be 1-1.5 mu m. Furthermore, a new fabrication technique has been developed and the LED structure, which has a **lens** monolithically formed on the InP substrate, has been fabricated for the first time at this wavelength. This **lensed** LED improves the coupling **efficiency** greatly, 2.7 times that of the flat LEDs. A maximum coupled power of approximately 0.20 and 0.31 mW has been attained at 100 mA for 85 mu m core, 0.16 NA and 100 mu m core, 0.25 NA step index fibers, respectively.

CT **GALLIUM ARSENIDE; III-V** SEMICONDUCTORS; INDIUM COMPOUNDS; **LENSES**; LIGHT EMITTING DIODES; OPTICAL COMMUNICATION EQUIPMENT

ST optical communication systems; fabrication; **active layer thickness** ; **high quantum efficiency**; junction misplacement; **InP carrier confining layer**; maximum output power; **coupling efficiency**; **high radiance InGaAsP-InP lensed LED**; 1.2 to 1.3 microns; Cd dopant; **III-V semiconductor**

L18 ANSWER 32 OF 32 INSPEC (C) 2004 IEE on STN

AN 1978:1194323 INSPEC DN A78042466; B78024337 Full-text

TI Monolithic integration of laser and amplifier/detector by twin-guide structure.

AU Kishino, K.; Suematsu, Y.; Utaka, K.; Kawanishi, H. (Dept. of Phys. Electronics, Tokyo Inst. of Technol., O-okayama, Meguro-ku, Tokyo, Japan)

SO Japanese Journal of Applied Physics (March 1978) vol.17, no.3, p.589-90.
CODEN: JJAPA5 ISSN: 0021-4922

AB An integrated twin-guide (ITG) laser consists of an **active** waveguide-**layer** for laser oscillation, light amplification and detection etc., and an external passive waveguide through which **optical elements** can be coupled to each other. Thus it is possible by such structure to integrate monolithically many **optical elements**. The authors report an attempt at monolithic integration of a laser and a laser amplifier or a laser and a detector with AlGaAs twin-guide structure. As the laser amplifier in the structure contains a resonator, it shows the characteristics of an injection locked amplifier with an amplification factor of more than ten, and a maximum output power of about 130 mW. When no electrical bias is applied to the laser amplifier, it shows the function of a detector by which the coupling **efficiency** between the active and the passive waveguides is estimated to be about 60%.

CT ALUMINIUM COMPOUNDS; **GALLIUM ARSENIDE; III-V** SEMICONDUCTORS; INTEGRATED OPTICS; LASER CAVITY RESONATORS; OPTICAL WAVEGUIDES; SEMICONDUCTOR JUNCTION LASERS

ST laser amplifier; detector; AlGaAs; resonator; injection locked amplifier; twin guide structure; integrated twin guide laser; **active waveguide layer**; monolithic integration